

CLAIMS

We claim:

1. An optical memory card comprising:  
a substrate having a data zone;  
an information carrying layer formed on said substrate over said data zone;  
at least one diffractive optical element positioned on the substrate; and  
a metal element coupled to said substrate, wherein said metal element  
magnetically holds said substrate to a chuck.
2. The optical memory card of claim 1, further comprising a protective layer  
over said information carrying layer and said at least one diffractive optical element.
3. The optical memory card of claim 1, wherein said at least one diffractive  
optical element is embossed in said substrate and is positioned within said data zone.
4. The optical memory card of claim 1, wherein said at least one diffractive  
optical element is embossed in said substrate and is positioned outside of said data zone.
5. The optical memory card of claim 1, wherein the information carrying  
layer formed on said body comprises a reflective layer.
6. The optical memory card of claim 1, wherein said information carrying  
layer includes at least one of a CD and DVD layer.
7. The optical memory card of claim 1, wherein said data zone has an inner  
radius of approximately 12mm.
8. The optical memory card of claim 1, wherein said metal element is a disk.
9. The optical memory card of claim 1, wherein said metal element includes  
an integrally formed alignment hole.

10. The optical memory card of claim 1, wherein said metal element includes an integrally formed alignment protrusion.

11. The optical memory card of claim 1, wherein said substrate includes an  
5 integrally formed alignment hole.

12. The optical memory card of claim 1, wherein said substrate includes an integrally formed alignment protrusion.

10 13. The optical memory card of claim 1, wherein said card is formed in a rectangular shape.

14. The optical memory card of claim 1, wherein the information carrying layer is formed on a first side of said substrate and at least one diffractive optical element  
15 is positioned on an opposite second side of the substrate.

15. A memory card comprising:  
a substrate having a data zone encircling the center of said substrate;  
an information carrying layer covering said data zone; and  
20 a metal element coupled to said substrate, wherein said metal element magnetically holds said substrate to a chuck.

16. The memory card of claim 15, wherein said metal element is a disk.

25 17. The memory card of claim 15, wherein said metal element has a thickness equal to the thickness of said substrate.

18. The memory card of claim 15, wherein said metal element includes an integrally formed hole.

30 19. The memory card of claim 15, wherein said metal element includes an integrally formed protrusion.

20. The memory card of claim 15, wherein said substrate includes an integrally formed alignment hole.

5 21. The optical memory card of claim 15, wherein said substrate includes an integrally formed alignment protrusion.

22. The memory card of claim 15, further comprising at least one diffractive optical element in the substrate.

10 23. The memory card of claim 22, wherein said at least one diffractive optical element is embossed in said substrate and is positioned within said data zone.

15 24. The memory card of claim 22, wherein said at least one diffractive optical element is embossed in said substrate and is positioned outside of said data zone.

20 25. The memory card of claim 20, wherein the information carrying layer is formed on a first side of said substrate and at least one diffractive optical element is positioned on an opposite second side of the substrate.

26. The memory card of claim 15, wherein said information carrying layer includes at least one of a CD and DVD.

25 27. A memory card comprising:  
a substrate having a data zone;  
an information carrying layer formed on said substrate over said data zone;  
and  
at least one diffractive optical element in the substrate.

30 28. The memory card of claim 27, further comprising a metal element coupled to said substrate.

29. The memory card of claim 28, wherein said metal element is centrally located on said substrate.

30. The memory card of claim 28, wherein said metal element is a disk.

5 31. The memory card of claim 28, wherein said metal element has a thickness equal the thickness of said substrate.

32. The memory card of claim 28, wherein said metal element includes an  
10 integrally formed hole.

33. The memory card of claim 28, wherein said metal element includes an integrally formed protrusion.

15 34. The memory card of claim 28, wherein said at least one diffractive optical element is embossed in said substrate and is positioned within said data zone.

35. The memory card of claim 28, wherein said at least one diffractive optical element is embossed in said substrate and is positioned outside of said data zone.

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36. A method for manufacturing a memory card comprising:  
embossing a substrate with a desired diffractive optical element design;  
embossing grooves on said substrate; and  
providing an information carrying layer over the grooves embossed on  
25 said substrate.

37. The method for manufacturing a memory card of claim 36, wherein said grooves are circular grooves.

30 38. The method for manufacturing a memory card of claim 36, wherein said grooves are spiral grooves.

39. The method for manufacturing a memory card of claim 36, wherein embossing said diffractive optical element design and said grooves is done with a single stamp.

5 40. The method for manufacturing a memory card of claim 36, wherein said information carrying layer comprises at least one of a CD and a DVD layer.

41. The method for manufacturing a memory card of claim 36, further comprising layering a protective coating over the information carrying layer and the  
10 diffractive optical elements.

42. The method for manufacturing a memory card of claim 36, wherein the at least one diffractive optical element is embossed within said grooves.

15 43. The method for manufacturing a memory card of claim 36, wherein the at least one diffractive optical element is embossed outside of said grooves.

44. The method for manufacturing a memory card of claim 36, further comprising a metal element for holding said card to a magnetic chuck coupled to said  
20 substrate.

45. The method for manufacturing a memory card of claim 44, wherein said metal element is coupled at the center of said substrate.

25 46. A driver for reading an optical memory card having an optical information carrying layer, said optical memory card having a metal element, said driver comprising:  
a magnetic chuck driven by a motor, wherein said metal element of said memory card is magnetically held adjacent to said magnetic chuck and said memory card is rotated; and  
30 a reading laser for reading information from said optical memory card.

47. The driver of claim 46, further comprising at least one hole to engage with and center said memory card.

48. The driver of claim 46, further comprising at least one protrusion to  
5 engage with and center said memory card.

49. The driver of claim 46, wherein said light source is a laser.

50. The driver of claim 46, further comprising a collimating lens positioned in  
10 the path of said light beam.

51. The driver of claim 46, further comprising a light source positioned to  
create a light beam incident upon a diffractive optical element of the memory  
card, and  
15 a photodetector positioned to receive light diffracted from said diffractive  
optical element.

52. The driver of claim 51, wherein said light source is a laser.

53. A driver for reading and authenticating an optical memory card having an  
20 optical information carrying layer comprising:

a magnetic chuck driven by a motor, wherein a memory card is  
magnetically held adjacent to said magnetic chuck and rotated;  
a light source positioned to create a light beam incident upon a diffractive  
25 optical element of the memory card;  
a photodetector positioned to receive light diffracted from said diffractive  
optical element; and  
a reading laser for reading information from said optical memory card.

54. The driver of claim 53, wherein said light source is a laser.  
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55. The driver of claim 53, further comprising at least one hole to engage with and center said memory card.

56. The driver of claim 53, further comprising at least one protrusion to  
5 engage with and center said memory card.

57. A memory card comprising:  
a substrate having a center hole;  
at least one groove encircling said center hole in said substrate; and  
10 an information carrying layer over said at least one groove to form a data  
zone, said data zone having an inner diameter of approximately 24mm or less.

58. The memory card of claim 57, wherein said center hole is approximately  
3mm or less.

59. The memory card of claim 57, further comprising a metal element coupled  
15 to said substrate, wherein said metal element magnetically holds said substrate to a chuck.

60. The memory card of claim 57, further comprising at least one diffractive  
20 optical element in the substrate.

61. The memory card of claim 60, wherein said at least one diffractive optical  
element is embossed in said substrate and is positioned within said data zone.

62. The memory card of claim 57, wherein said data zone has an outer  
25 diameter of approximately 52mm.

63. The memory card of claim 57, wherein said information carrying layer  
extends to approximately the edges of said memory card.

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